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IMPROVED FAN GRILL CONSTRUCTION

BACKGROUND OF THE INVENTION

Field of the Invention

This invention relates to an improved fan grill guard construction of the type where the grill has an outer ring, which is dimensionally structured to provide greater airflow and diffusion.

DESCRIPTION OF THE PRIOR ART

The typical grill used on the front of oscillating, pedestal or wall mount fans is of round wire, with some fans such as shown in U.S. Patent No. 6,071,079 having a front grill of molded plastic. There are many advantages in using molded plastic grills, in that plastic does not rust, is inexpensive to mold and does not require welding or painting. In addition, plastic permits easy design variation to achieve a look that is less restrictive in the center, and allows the customer to see the blades.

Plastic grills can also be constructed so they do not require additional parts such as rings or clips for assembly.

While the prior art Patent No. 6,071,079, uses plastic grills, it is designed to provide a focused air pattern, which is not entirely satisfactory if used in an oscillating fan, as it results in an on-off air flow, which is not as desirable as a diffused air flow, which is obtained by the grill construction described herein.

SUMMARY OF THE INVENTION

It has now been found that an improved fan grill construction can be obtained for a front grill, which has an outer ring which is dimensionally structured so that the air flow is diffused instead of focused, resulting in an improved total air volume (NEMA CFM) over a larger area.

The principal object of the invention is to provide front grill construction for a fan that is dimensionally structured to provide increased air volume over a large area.

A further object of the invention is to provide fan grill construction that allows tighter spacing to the fan blade periphery to provide a more efficient package with improved safety.

A further object of the invention is to provide fan grill construction which adds mass to the outside of the grill to dampen vibration.

A further object of the invention is to provide a front grill which is constructed of molded plastic.

A further object of the invention is to provide a fan grill construction that can be adapted to a variety of types and sizes of fans.

A further object of the invention is to provide fan grill construction where the grill is not part of the support for the motor/blade assembly.

Other objects and advantageous features of the invention will be apparent from the description and claims.

BRIEF DESCRIPTION OF THE DRAWINGS

The nature and characteristic features of the invention will be more readily understood from the following description taken in connection with the accompanying drawings forming part hereof in which:

FIG. 1 is an exploded perspective view of a prior art fan;

FIG . 2 is an exploded perspective view of a fan with the new front grill construction of the invention;

FIG . 3 is a horizontal sectional view of the assembled prior art fan of FIG 1;

FIG. 4 is a view similar to FIG 3 but showing the improved fan grill construction of the invention, and

FIG . 5 is a graph comparing the performances of the prior art fan grill construction to the improved fan grill construction of the invention.

It should, of course, be understood that the description and drawings herein are merely illustrative and that various modifications and changes can be made in the structures disclosed without departing from the spirit of the invention.

Like numerals refer to like parts throughout the several views.

DESCRIPTION OF THE PREFERRED EMBODIMENT

When referring to the preferred embodiment, certain terminology will be utilized for the sake of clarity. Use of such terminology is intended to encompass

not only the described embodiment, but also technical equivalents which operate and function in substantially the same way to bring about the same result.

Referring now more particularly to FIGS. 1 and 3 of the drawings, a typical prior art fan 10 is illustrated. The fan 10 includes an electric motor housing 11, which contains an electric motor (not shown) of well known type, which may be connected to a source of electrical power (not shown). The fan motor has an output shaft 12, with a hub 14 of a blade assembly 15 attached thereto, with three blades 16 being shown.

The fan motor housing 11 may be mounted to a yoke (not shown) which may be mounted to a pedestal (not shown) or other well known support structure, which can rest on the floor, on a table or elsewhere as desired. The housing 11 has a rear grill 17 mounted thereto, which is of circular configuration, with a plurality of spaced radial ribs 18, connected to a plurality of concentric rings 19, with the radial ribs 18 extending out to a circumferential rim 20 and inwardly to a center ring 21. A front grill 25 is provided, which has a plurality of spaced radial ribs 26, which are connected to a plurality of concentric rings 27. The ribs 26 extend out to an outer rim 28, which mates with rim 20 of rear grill 17.

The radial ribs 26 also extend inwardly and are connected to a center plate 29.

Both the front and rear grills 25 and 17 are preferably formed of molded plastic.

As shown in Fig. 3, the arrows 30 illustrate the airflow through the rear grill 17, and out the front grill 25 in a focused pattern, which upon oscillation provides the on-off airflow that is not desirable.

Referring now more particularly to Figs 2 and 4, the improved front grill construction is therein illustrated and as part of a fan 50.

The fan 50 includes an electric motor housing 51, which contains an electric motor (not shown) of well known type which may be connected to a source of electrical energy (not shown). The fan motor has an output shaft 52, to which a hub 53 of a blade assembly 54 is attached, with the blade assembly having three blades 55.

The fan motor housing 51 may be mounted to a pedestal (not shown) or other structure as described for fan 10.

The motor housing 51 has a rear grill 57 mounted thereto in conventional manner such as by bolts (not shown).

The rear grill 57 has a plurality of concentric rings 58 to which spaced interrupted radial ribs 59 and 60 are connected. The ribs 59 are shorter than ribs 60 and extend out to a rim 62 of grill 57. The ribs 60 extend out to rim 62 and inwardly to a center ring 63 which is attached to motor housing 51.

A front grill 65 is provided, of circular configuration, with a plurality of concentric rings 66, which have a plurality of spaced radial ribs 67 and 68 connected thereto, with ribs 67 extending inwardly to a center plate 69, and outwardly to a ring 70 to be described.

The ribs 68 extend outwardly to ring 70, and inwardly short of plate 69.

The ring 70 includes a curved panel 71, which extends inwardly to an inclined panel 72, and outwardly to a rim 73. The rim 73 mates with rim 62 of grill 57 with spaced tabs 62 A therearound, which are engaged with slots 74 in rim 73 to retain the grills 57 and 65 together.

Sub A1 In Fig 4 the ring dimensions are indicated by the letters A, B, C and D. The dimension A is the distance from the tip 75 of a blade 55 to the inside diameter of the ring 70. The dimension B is the depth of ring 72, or the distance from the rear most portion of rim 73 to the front end of panel 71. The dimension C is the width of ring 72. the dimension D is the diameter of the blade assembly 54.

The dimensions A, B, C and D for the fan 50 in the preferred embodiment for a 16 inch fan with blade diameter $D = 16$ inches, are $A = 0.170$ inches, $B = 1.41$ inches and $C = 0.95$ inches.

The dimensions A, B, and C for oscillating fans with a typical blade diameter from 6 to 30 inches, with D as an initial dimensional base point, have the dimensions calculated as follows where the range of A is $\pm 40\%$ of D as measured from tip 75, $B = 0.60$ to 4.5 inch, and $C = 40$ to $200\% B$.

It has been found by testing that a 16 inch fan 50 with a front grill 65, compared to a prior art 16 inch fan 10 with front grill 25, provides significant improvement.

The fan 50 on high speed at 9 feet from the fan provided an air velocity (NEMA CFM) of 5710.00, whereas fan 10 provided an air velocity (NEMA CFM) of 4737.10.

Referring to Fig 5 tests were run on two fans comparing the fans 10 and 50 with measurements at horizontal distances to 34 inches on each side. The results were plotted in in Fig 6 which shows significantly greater air velocities over the distance for fan 50 with the improved front grill construction.

It will thus be seen that an improved fan grill construction has been provided with which the objects of the invention are achieved.